2014 DEER Update Study
Update Approach

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DRAFT

Contents

Background to DEER Values and Methods

The Database of Energy Efficiency Resources (DEER) consists of deemed ex ante values for a discreet set of measures as well as prescribed methodologies for calculating savings of measures not included in the DEER. The database of deemed values includes the following:

Unit Energy Savings (UES): UES values are the annual savings associated with a specific measure. Savings include annual total electric savings in kWh, annual total gas savings in therms and peak period demand reduction in kW. Savings are expressed in terms of a "common unit." Examples of common units are:

- tons of cooling capacity
- a single appliance such as a clothes washer
- a single dwelling unit such as a single family home or individual apartment; square foot of conditioned floor area
- lighting fixture or lamp

Impact Load Shapes: The impact load shape is the normalized, full-year, hourly profile that dictates the distribution of the UES. The load shape includes 8,760 values, one for each hour of the year. All 8,760 values sum to one. Multiplying the UES value (kWh or therm) by the value for any particular hour yields the energy savings for that particular hour.

Effective Useful Life (EUL): The EUL is an estimate of the median number of years that a measure (or, more specifically, a technology) stays in place and is still operational.

Remaining Useful Life (RUL): The RUL is an estimate of the median number of years a technology or piece of equipment, that is being replaced or altered by an energy efficiency program, would remain in service and operational had the program intervention not caused the replacement or alteration. At this time, DEER assumes that RUL is equal to one-third of the EUL.

Net to Gross Ratio (NTG): The NTG is the ratio or percentage of net program impacts divided by gross or total impacts. NTG is used to estimate and describe the free-ridership that may be occurring within energy efficiency programs.

Technology and Measure Costs: Deemed cost values in DEER include the following values:

- Basis material costs for baseline and measure technologies
- Basis installation costs for measures and technologies
- Regional multipliers for labor and material costs that take into account cost variations by geographic region

In addition to the actual ex ante values, the methodologies and assumptions that are used to generate the ex ante values are also considered to be part of DEER. In other words, DEER includes values, methods and assumptions. Any non-DEER values that are developed and supported via workpapers are required to follow DEER methods whenever those methods are applicable to the proposed measures. The simulation tools used for developing DEER ex ante values are available to implementers so that they can make modifications to DEER simulations and develop variations of measures. Some of the key features of DEER are described below:

Measure Analysis Software

The measure analysis software (MAS) is used to develop all DEER savings values. The software automatically creates all necessary simulation models for estimating the savings of measures defined in DEER. Using the MAS, efficiency program managers can generate sets of simulation models, and then modify only the portions of the models needed to represent the non-DEER measure or technology.

HVAC Interactive Effects

HVAC interactive effects are used to calculate the whole building energy impacts for internal gains measures such as lighting retrofits or appliance replacements. The interactive effects account for the interaction of the internals gains with the space conditioning equipment. Their application almost always results in increased electricity savings since the reduction in internal gains in turn causes a reduction in energy needed for space cooling. However, there is almost always an increase in natural gas consumption since the reduction in internal gains will increase the need for space heating operation during winter operations. HVAC interactive effects are outputs from a limited set of simulations, and can be used to calculate savings of a wide range of additional DEER and non-DEER measures without having to perform additional simulations.

Prototypical Building Features

DEER savings values are developed from simulations for a family of 26 prototypical building types. The physical characteristics of these building types vary depending on the type, age and location of the building. Since the first publication of the DEER in 1994, these physical characteristics have been periodically revised based on field research as well as the on-going revisions to California Title 24 energy efficiency standards. Table 1 summarizes some of the most important prototypical characteristics of the DEER building models and whether those characteristics vary by building type, climate zone or vintage. Building characteristics are inputs to the DEER simulation process.

Table 1 - Prototypical Building Characteristics

	Nonresidential Variability			Residential Variability		
	Building Type	Climate Zone	Vintage	Building Type	Climate Zone	Vintage
General Building Characteristics						
Floor Area	X			X	X	X
Number of stories	X			X	X	X
Footprint shape	X			X		
Building Usage and Operation						
Overall operating hours (open/closed)	X			X		
Area and distribution of building activity/use types	X			X		
Architectural Design and Performance						
Glazing area	X			X	X	X
Glazing orientation	X			X		
Glazing performance	X	X	X			
Wall/Roof/Floor construction types	X			X		X
Wall/Roof/Floor construction performance	X	X	X	X	X	X
HVAC Design and Performance						
Predominant HVAC system types and configuration	X		X	X		
HVAC design and operating parameters	X	X	X	X	X	X
HVAC equipment efficiency levels	X		X	X		X
Internal Gains Characteristics						
End-use usage profiles	X			X		
End-use intensity levels	X		X	X		X

Building Weights

DEER includes a set of building weights tables that define the relative floor space of each building type within each IOU service territory, broken down by vintage and climate zone. Nonresidential building weights are developed from the Commercial Enduse Survey (CEUS) data, while residential building weights are developed from the Residential Appliance Saturation Survey (RASS) data. This supports the development of "rolled-up" or typical savings values for measures where the actual participation among the population of buildings is not known. A common application of using weights would be the upstream residential CFL incentive program. Since it cannot be known exactly what types of residential buildings would eventually incur CFL installations, an overall savings can be determined by taking the individual savings for each residential permutation (by building type, climate zone and vintage) and multiplying each savings result by the relative fraction of each building type and summing together.

Background to DEER Measure Definition

Measures in DEER are defined as a difference between two technologies: a measure technology and a baseline technology. There are two possible baseline technologies depending on the measure implementation and delivery approach:

Customer Average (or "Pre-existing"): This Customer Average (or Pre-existing condition) represents the typical conditions found at the building or site at the time the measure technology is installed. This is the likely baseline condition for early retirement and retrofit add-on measures[1].

Code Baseline: The Code Baseline is the efficiency of equipment as required by code or dictated by standard practice. This is the required baseline for new construction and replace-on-burnout implementations.

Establishing the Customer Average efficiency is often dependent on the type of technology being installed. Sometimes measures are defined as moving from one specific technology to another. An example of this would be replacing a linear fluorescent T-12 fixture having an input power rating of 74 watts with a T-8 fixture having an input power rating of 54 watts. In this case, it is assumed that the energy performance of the both the baseline and measure technologies are known with the Customer Average technology having an input power rating of 74 watts. In other cases, it is often not possible to determine the efficiency of the baseline case. An example of this would be the replacement of a package HVAC unit. In these cases the customer average efficiency is assumed to be the prototypical efficiency as discussed above.

2014 DEER Update Approach

The 2014 update will incorporate a comprehensive review of the most recent research and technology developments available by summer of 2013. DEER updates are generally fall into three categories:

Calculation/Methodology: Based on research as well as revisions to the simulation tools, some of the calculation methodologies will be revised. These revisions will involve changes to the methods used within the simulation software to represent certain building features such as outside air infiltration or HVAC system controls behavior.

Prototypical Assumptions: The latest building stock research may indicate revisions to prototypical assumptions. For example, on-site research may indicate that typical installed lighting power levels or HVAC equipment efficiencies may have changed since last updated for DEER. Refer to Table 1 for a listing of some of the most common prototypical characteristics.

[1] For early retirement measures, the savings calculations are divided into two periods. The first period is for the RUL where the baseline is the customer average. The second period is equal to the EUL minus the RUL and must use the code baseline which is the equipment that the customer would have to install at the end of the existing equipment's useful life. This calculation is referred to as a "dual baseline" calculation, where the savings calculation is divided into two periods, and each period has a different baseline, however, the savings for each period are still calculated as the difference between the energy use of two different technologies.

Measure/Technology Definitions or Characteristics:	Research, advances in technologies and updates to governing standards or guidelines often indicate the need for revisions to measure definitions. For example, research of current purchasing practices for air conditioning equipment may indicate revisions to baseline definitions for package HVAC measures. Changes to EnergyStar standards may require increased efficiency levels for appliance measures. Additionally, utility program designs may be targeting different efficiency levels than are currently covered by DEER.

The DEER team will look to several different areas of work when developing DEER updates. The DEER team will work with Energy Division staff and stakeholders to determine the final scope of updates. Decisions about the updates will be based on the several factors including:

- Importance of the updates as reflected in accomplishment claims to date
- Level of effort and available staff and consultant resources to incorporate the revisions
- Likelihood that on-going research will be at a sufficient state of completion by the time revisions must begin
- Preliminary assessment of the expected change in savings due to revisions

The expected sources of information for DEER updates are discussed in more detail below:

Previously Retired Measures

A large number of measures that were originally included in DEER2005 were removed as part of the 2011 DEER update. In the comments leading up to issuance of D12-05-015, several parties voiced concern that some of these measures are still prominent in program accomplishments and requested that updates be included in DEER as soon as possible. The DEER team will examine the set of removed measures and update the removed measures as appropriate, in consideration of the available research and time constraints. The complete list of DEER2005 measures, along with whether they were included in the DEER2011 update, is included as Attachment A.

Improvements to Analysis Tools and Methodologies

The DEER team has added several improvements to the simulation tools used to estimate energy savings mainly with respect to modeling of residential infiltration and duct leakage.

Workpapers for NonDEER Measures for the 2013-2014 Cycle

Utilities have noted that DEER measure definitions sometime lag the current industry standards. For example, current high-efficiency standards for package HVAC equipment published by the Consortium for Energy Efficiency (CEE) use different efficiency descriptors than those used to define DEER high efficiency HVAC equipment. In response to this, the utilities have developed workpapers that adapt current DEER savings values to those more in line with the CEE efficiency descriptors for package HVAC equipment.

In some cases, measures covered by a workpaper may comprise a large portion of the portfolio of savings. Sometimes, each utility has submitted a workpaper covering the same measure but with different savings values. Utilities have also proposed in workpapers to reintroduce measures that were removed from DEER2011. In some cases the workpaper proposes to use the exact savings values that were previously removed from DEER. All of these scenarios indicate possible additions to DEER.

2011 Potential and Goals Study

The Potential and Goals Study includes the examination of technology groups for their technical, economic and market energy efficiency potential. The report examines the most conventional technologies in the four primary sectors: residential, commercial, industrial and agricultural. The study used utility claims data to identify the predominant measures and technologies along with whether they were DEER, non-DEER or custom measures. Additionally, the study includes an examination of the energy efficiency potential for 67 emerging technologies. The DEER team will work with the consultants who developed the Potential and Goals Study to identify more specifically the technologies that present the greatest potential. This set of technologies can then be cross-referenced with other research areas discussed herein as well as the current set of DEER measures and possible develop new measures or methods to be included in DEER.

Evaluation, Measurement and Verification Research for the 2006-2008 Cycle

The most valuable research from the 2006-2008 EM&V effort was the lighting logger studies for small commercial buildings, community colleges and universities. The logger data can be used to update the prototypical operating schedules for different types of lighting technologies that are used in the building simulations. As part of the DEER 2011 update, the DEER team developed typical lighting profiles by study site. The next step is to compare the site data to the current set of DEER building prototypes and make revisions as needed including:

- Updates to activity area distribution by building type
- Revisions to lighting usage profiles by activity
- Revise other operating schedules such as equipment, HVAC and occupancy if revised lighting schedules clearly indicate conflicts with other assumptions

Commercial Saturation Survey

The Commercial Saturation Survey (CSS) objectives are primarily to identify current characteristics of the commercial building stock including:

- Floor space of different commercial building types
- Lighting technology types and quantities in use including the efficiency share of different types of linear fluorescent technologies
- Quantity and type of office equipment and electronics including computers, printers and televisions

- HVAC equipment currently in use, focusing on package HVAC, with the intent to illustrate the current baseline efficiencies of HVAC equipment
- Commercial refrigeration equipment including information on the configuration and efficiency of display cases, walk-in coolers and freezers, compressor arrays and remote condensers.

Commercial Market Share Tracking

The Commercial Market Share Tracking (CMST) research objectives are primarily to identify current practices for purchase, installation and operation of important energy using equipment and systems in commercial buildings including:

- Purchasing practices for linear fluorescent lighting equipment since 2009 including purchases with and without program incentives
- Television purchases with the intent of identifying efficiency share of televisions
- Purchasing practices for package HVAC equipment with the intent of identifying efficiency shares of package HVAC equipment
- Compare phone survey results for purchases to site-based audits and records reviews. This will help to understand the potential inaccuracies for using phone surveys and other "self-report" data collection approaches

California Lighting and Appliance Saturation Study

The California Lighting and Appliance Saturation Study (CLASS) included site visits to almost 2,000 homes and collected a wide variety of data on energy using features, lighting and appliances. One of the principle objectives CLASS is to characterize installed appliances and energy-consuming, electric and gas-powered products with high unit energy consumption (UEC), high on-peak demand, and those for which IOU rebate programs.

Residential/Advanced/Upstream Lighting Impact Evaluation

Similar to similar previous evaluations, the Residential/Advanced/Upstream Lighting Impact Evaluation (ULP Evaluation) will be most helpful to DEER updates by examining, for lamps installed in the 2010-2012 cycle, the following characteristics:

- Typical CFL to non-CFL wattage reductions by lamp type (such as spiral, A-lamp, reflector, etc.) and location (interior vs. exterior)
- Usage patterns of CFLs with the highest resolution possible. Previous studies have included adequate data to develop usage profiles for interior and exterior lighting profiles.

2009 Residential Appliance Saturation Survey

The California Energy Commission provides regular updates to the Residential Appliance Saturation Survey (RASS). RASS is one of the most valuable sources of information for residential Unit Energy Consumption (UEC) values. The DEER team uses these UECs to calibrate the prototypical residential simulation models so that these models yield annual energy use values for heating and cooling that

are similar to RASS. Additionally, RASS is also the best data source for establishing residential building weights.

Since CEC uses RASS as part of its energy forecasts, RASS data is usually reported in CEC forecasting zones, which are different from CEC climate zones. In the past, the DEER team has worked with the RASS consultants to reanalyze the raw data to develop UECs and building weights by CEC climate zone.

Business and Consumer Electronics Impact Evaluation

The main objective of the Business and Consumer Electronics (BCE) Impact Evaluation was to determine an NTG for the current mid-stream television incentives.

Measure Cost Study

The measure cost contractor intends to develop flexible cost models for a large portion of the technologies currently in DEER and also for many technologies that are often supported with workpapers or found in custom measures. The concept of the flexible model is that the cost of a particular technology can be expressed as a function of specific, but variable, features of a technology or retrofit measure. For example, the cost of a refrigerator can be expressed as function of its size, freezer configuration, the existence of features (such as an ice maker) and its energy efficiency level. All of these features are readily determined for any refrigerator currently available.

The measure cost team is still developing the costing methodology, and the DEER team will continue to interact with the cost team. The DEER team will evaluate and consider for inclusion any applicable cost models available when revision to the DEER cost database commences.

Attachment A – Status of 2005 DEER Measures: 2011 Update

DEER 2005 Measure ID	Sector	**Included in DEER 2011?**	Reason for Removing	Measure Name	Measure Description
D03-001	NonRes	FALSE	Modeling method updated	Reduced Lighting - 10% reduction	all lighting levels reduced by 10%
D03-002	NonRes	FALSE	Modeling method updated	Reduced Lighting - 40% reduction	all lighting levels reduced by 40%
D03-003	NonRes	TRUE		Small area lighting sensor control	lighting level reduced based on bldg type, activity area
D03-004	NonRes	TRUE		Large area lighting sensor control	lighting level reduced based on bldg type, activity area
D03-005	NonRes	TRUE		Add daylighting controls to side-lit space w/ cont. ctrl	add daylighting controls, min. lumen level based on bldg type
D03-006	NonRes	TRUE		Add daylighting controls to side-lit space w/ 2-step ctrl	add daylighting controls, min. lumen level based on bldg type
D03-007	NonRes	TRUE		Add daylighting controls to top-lit space w/ cont. ctrl	add daylighting controls, min. lumen level based on bldg type
D03-008	NonRes	TRUE		Add daylighting controls to top-lit space w/ 1-step ctrl	add daylighting controls, min. lumen level based on bldg type
D03-009	NonRes	TRUE		Add daylighting controls to top-lit space w/ 2-step ctrl	add daylighting controls, min. lumen level based on bldg type
D03-010	NonRes	TRUE		EMS system reduced unoccupied lighting levels	minimum unoccupied lighting power density based on bldg type
D03-011	NonRes	FALSE	Modeling method updated	Plug Loads reduced by 5%	all plug loads reduced by 5%
D03-012	NonRes	FALSE	Modeling method updated	Plug Loads reduced by 10%	all plug loads reduced by 10%
D03-013	NonRes	TRUE		Older building ceiling/roof insulation up to current standards	Ceiling R-value for oldest vintages increased to 'new' level
D03-014	NonRes	FALSE	no longer needed	Insulation added to poorly insulated DHW tanks	Approximately R-12 tank insulation, based on tank size
D03-016	NonRes	TRUE		Light Colored Roof	Roof absorptivity = 0.45
D03-017	NonRes	TRUE		North glass SHGC 15% less than required	North glass SHGC 15% less than required by T-24
D03-018	NonRes	TRUE		East glass SHGC 20% less than required	East glass SHGC 20% less than required by T-24
D03-019	NonRes	TRUE		South glass SHGC 20% less than required	South glass SHGC 20% less than required by T-24
D03-020	NonRes	TRUE		West glass SHGC 20% less than required	West glass SHGC 20% less than required by T-24

DEER 2005 Measure ID	Sector	**Included in DEER 2011?**	Reason for Removing	Measure Name	Measure Description
D03-021	NonRes	TRUE		North glass SHGC 20% less than required	North glass SHGC 20% less than required by T-24
D03-022	NonRes	TRUE		East glass SHGC 30% less than required	East glass SHGC 30% less than required by T-24
D03-023	NonRes	TRUE		South glass SHGC 30% less than required	South glass SHGC 30% less than required by T-24
D03-024	NonRes	TRUE		West glass SHGC 30% less than required	West glass SHGC 30% less than required by T-24
D03-025	NonRes	TRUE		High perf glass (PI 1.15) and cont dayltg ctrls in side-lit spaces	glass w/ indicated performance index in daylit spaces, cont. ctrl
D03-026	NonRes	TRUE		High perf glass (PI 1.26) and cont dayltg ctrls in side-lit spaces	glass w/ indicated performance index in daylit spaces, cont. ctrl
D03-027	NonRes	TRUE		High perf glass (PI 1.38) and cont dayltg ctrls in side-lit spaces	glass w/ indicated performance index in daylit spaces, cont. ctrl
D03-028	NonRes	TRUE		High perf glass (PI 1.15) and 2-step dayltg ctrls in side-lit spaces	glass w/ indicated performance index in daylit spaces, 2-step ctrl
D03-029	NonRes	TRUE		High perf glass (PI 1.26) and 2-step dayltg ctrls in side-lit spaces	glass w/ indicated performance index in daylit spaces, 2-step ctrl
D03-030	NonRes	TRUE		High perf glass (PI 1.38) and 2-step dayltg ctrls in side-lit spaces	glass w/ indicated performance index in daylit spaces, 2-step ctrl
D03-031	NonRes	TRUE		High perf glass (PI 0.81) and cont dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, cont. ctrl
D03-032	NonRes	TRUE		High perf glass (PI 0.92) and cont dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, cont. ctrl
D03-033	NonRes	TRUE		High perf glass (PI 1.03) and cont dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, cont. ctrl
D03-034	NonRes	TRUE		High perf glass (PI 0.81) and 1-step dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, 1-step ctrl
D03-035	NonRes	TRUE		High perf glass (PI 0.92) and 1-step dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, 1-step ctrl

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-036	NonRes	TRUE		High perf glass (PI 1.03) and 1-step dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, 1-step ctrl
D03-037	NonRes	TRUE		High perf glass (PI 0.81) and 2-step dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, 2-step ctrl
D03-038	NonRes	TRUE		High perf glass (PI 0.92) and 2-step dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, 2-step ctrl
D03-039	NonRes	TRUE		High perf glass (PI 1.03) and 2-step dayltg ctrls in top-lit spaces	skylight w/ indicated performance index & T24 reqmts in daylit spaces, 2-step ctrl
D03-040	NonRes	FALSE	Updated in v4.00	Centrifugal chillers (< 150 tons) with improved kW/ton	Water cooled centrifugal chiller (0.560 kW/ton)
D03-041	NonRes	FALSE	Updated in v4.00	Reciprocating air-cooled chillers with improved kW/ton	Air cooled package reciprocating chiller (1.008 kW/ton)
D03-042	NonRes	FALSE	Updated in v4.00	VSD Centrifugal Chiller (< 150 tons) w/Load control tower	Water cooled VSD centrifugal chiller (0.560 kW/ton), load control tower
D03-043	NonRes	FALSE	no longer needed	Gas Absorption Central Chiller (direct fired)	Gas absorption chiller (direct fired) (0.0071 EIR, 1.0 HIR)
D03-044	NonRes	TRUE		Chilled Water Loop temperature control	Chilled water loop temperature set to 'Load Reset'
D03-045	NonRes	TRUE		Hot Water Loop temperature control	Hot water loop temperature set to 'Load Reset'
D03-046	NonRes	TRUE		Replace 3-way valves in CHW loop with 2-way	2-way valves, with single speed pump
D03-047	NonRes	TRUE		Variable speed drive for chilled water loop	add variable speed pump to chilled water loop
D03-048	NonRes	TRUE		Replace 3-way valves in HW loop with 2-way	2-way valves, with single speed pump
D03-049	NonRes	TRUE		Variable speed drive for hot water loop	add variable speed pump to hot water loop
D03-050	NonRes	TRUE		VAV box retrofit on constant volume system	damper controlled VAV with 30% min-cfm-ratio
D03-051	NonRes	TRUE		Variable Frequency Drive motors use on VAV fans	VFD with 30% min-cfm-ratio
D03-052	NonRes	FALSE	no longer needed	Convert VAVS system to PIU system	Convert VAVS sytem to PIU system
D03-053	NonRes	TRUE		Make-up Air Indirect Evaporative cooling	indirect evap cooling for make-up air only, 65% effectiveness

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-054	NonRes	TRUE		Make-up Air Indirect Evaporative cooling	indirect evap cooling for make-up air only, 65% effectiveness
D03-055	NonRes	TRUE		Base ventilation rate 25% higher than required	standard ventilation rate
D03-056	NonRes	TRUE		heat recovery from exhaust hoods	70% heat recovery effectiveness
D03-057	NonRes	TRUE		rotary air-to-air enthalpy heat recovery	70% sensible and latent recovery effectiveness
D03-058	NonRes	TRUE		Packaged system Economizer retrofit	Add econo with Econo-Lockout=NO, DB limit = 68, Max OSA = 100%
D03-059	NonRes	TRUE		Central HVAC system Economizer retrofit	Add ecomizer with Econo-Lockout=NO, DB limit = 68, Max OSA = 100%
D03-060	NonRes	TRUE		Restore degraded economizer performance	ecomizer with Econo-Lockout=NO, DB limit = 68, Max OSA = 100%
D03-061	NonRes	FALSE	requires update	Dirty Air-cooled condenser coils are cleaned	standard equipment efficiency
D03-062	NonRes	TRUE		Convert Air-Cooled Condenser to Water-Cooled	packaged system with water cooled condenser
D03-063	NonRes	TRUE		Two-Speed Tower Fans replace Single-Speed	Two-speed tower fans on all central plants
D03-064	NonRes	TRUE		Variable-Speed Tower Fans replace Two-Speed	Variable-speed tower fans on all central plants
D03-065	NonRes	TRUE		High efficiency gas furnace replace std efficiency	packaged system with 94 AFUE furnace
D03-066	NonRes	FALSE	Updated in v4.00	High efficiency Large boiler (>300 kBTU/hr)	Central boiler with efficiency of 85%
D03-067	NonRes	FALSE	Updated in v4.00	High efficiency Small boiler (<300 kBTU/hr)	Central boiler with efficiency of 84.5%
D03-068	NonRes	FALSE	Updated in v4.00	High efficiency Steam boiler (<300 kBTU/hr)	Central steam boiler with efficiency of 84%
D03-069	NonRes	TRUE		High efficiency WLHP system for Large Office	WLHP system with 14.0 EER / 4.6 COP
D03-070	NonRes	TRUE		Variable flow hydronic water loop	2-way valves, with VSD pumping
D03-071	NonRes	TRUE		time clocks control packaged system operation	Supply fan operation matches building operation
D03-072	NonRes	FALSE	requires update	Suite of EMS measures	CHW & HW reset, reduced nighttime lighting levels
D03-073	NonRes	TRUE		Install programmable thermostats in older bldgs	unoccupied period has heating setback/cooling setup

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-075	NonRes	TRUE		Increased duct insulation in older vintages	Old vintage increases duct insulation to R-4.2, 78-91 vintage to R-8
D03-076	NonRes	FALSE	Updated in v4.00	High eff. packaged split system A/C (< 65k, single phase)	14 SEER (12.15 EER) Split-System Air Conditioner
D03-077	NonRes	FALSE	Updated in v4.00	High eff. packaged split system HP (< 65k, single phase)	14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat Pump
D03-078	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system A/C (< 65k, single phase)	14 SEER (12.15 EER) Package Air Conditioner
D03-079	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system A/C (65-134k)	11 EER Package Air Conditioner
D03-080	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system HP (< 65k, single phase)	14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) Package A/C Heat Pump
D03-081	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system HP (65-134k)	11 EER / 3.4 COP Split/Package A/C Heat Pump
D03-082	NonRes	TRUE		High eff. packaged system with evap cooled cond (< 65k)	14 EER Water-Cooled Package Air Conditioner
D03-083	NonRes	TRUE		High eff. packaged system with evap cooled cond (>= 65k)	14 EER Water-Cooled Package Air Conditioner
D03-084	NonRes	TRUE		High eff. packaged terminal air-conditioner (< 7k)	11.29 EER (based on vintage) package terminal A/C
D03-085	NonRes	TRUE		High eff. packaged terminal heat pump (< 7k)	11.17 EER / 3.3 COP (based on vintage) package terminal HP
D03-086	NonRes	TRUE	removed older vintages	Premium efficiency of better motors used for application	premium motor efficiency based on typical motor size
D03-087	NonRes	TRUE	removed older vintages	Premium efficiency of better motors used for application	premium motor efficiency based on typical motor size
D03-088	NonRes	TRUE	removed older vintages	Premium efficiency of better motors used for application	premium motor efficiency based on typical motor size
D03-089	NonRes	TRUE	removed older vintages	Premium efficiency of better motors used for application	premium motor efficiency based on typical motor size
D03-090	NonRes	TRUE	removed older vintages	Premium efficiency of better motors used for application	premium motor efficiency based on typical motor size
D03-091	NonRes	TRUE	removed older vintages	Premium efficiency of better motors used for application	premium motor efficiency based on typical motor size
D03-094	NonRes	FALSE	Updated in v4.00	tankless electric hot water system	zero tank loss
D03-095	NonRes	TRUE		DHW circulation pump contolled by timeclock	DHW circulation pump turns off during low operation hours
D03-098	NonRes	TRUE		Add water economizer heat exchanger to CW Loop	Non integrated evaporator precooler heat exchanger
D03-099	NonRes	TRUE		High eff. packaged terminal air-conditioner (7-15k)	10.27 EER (based on vintage) package terminal A/C

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-100	NonRes	TRUE		High eff. packaged terminal air-conditioner (> 15k)	9.25 EER (based on vintage) package terminal A/C
D03-101	NonRes	TRUE		High eff. packaged terminal heat pump (7-15k)	10.15 EER / 3.1 COP (based on vintage) package terminal HP
D03-102	NonRes	TRUE		High eff. packaged terminal heat pump (> 15k)	9.13 EER / 3.0 COP (based on vintage) package terminal HP
D03-103	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system A/C (135-239k)	10.8 EER Package Air Conditioner
D03-104	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system A/C (240-759k)	10.0 EER Package Air Conditioner
D03-105	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system A/C (>= 760k)	10.0 EER Package Air Conditioner
D03-106	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system HP (135-239k)	10.8 EER / 3.4 COP Package A/C Heat Pump
D03-107	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system HP (240-759k)	10.0 EER / 3.4 COP Package A/C Heat Pump
D03-108	NonRes	FALSE	Updated in v4.00	High eff. packaged split system A/C (< 65k, 3 phase before 2008)	12 SEER three phase split-system A/C
D03-109	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system A/C (< 65k, 12 SEER, 3 phase before 2008)	12 SEER three phase package A/C
D03-110	NonRes	FALSE	Not needed	High eff. packaged unitary system A/C (< 65k, 13 SEER, 3 phase before 2008)	13 SEER three phase package A/C
D03-111	NonRes	FALSE	Updated in v4.00	High eff. packaged split system HP (< 65k, 3 phase before 2008)	12 SEER / 7.4 HSPF three phase split-system A/C heat pump
D03-112	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system HP (< 65k, 12 SEER, 3 phase before 2008)	12 SEER / 7.4 HSPF three phase package A/C Heat Pump
D03-113	NonRes	FALSE	Updated in v4.00	High eff. packaged unitary system HP (< 65k, 13 SEER, 3 phase before 2008)	13 SEER / 7.7 HSPF three phase package A/C Heat Pump
D03-114	NonRes	FALSE	Updated in v4.00	Air-cooled screw chiller with improved kw/ton	Air cooled screw chiller (1.008 kW/ton)
D03-115	NonRes	FALSE	Updated in v4.00	Reciprocating water-cooled chillers with improved kW/ton	Water cooled reciprocating chiller (0.672 kW/ton)
D03-116	NonRes	FALSE	Updated in v4.00	Centrifugal chillers (150-299 tons) with improved kW/ton	Water cooled centrifugal chiller (0.507 kW/ton)
D03-117	NonRes	FALSE	Updated in v4.00	Centrifugal chillers (>= 300 tons) with improved kW/ton	Water cooled centrifugal chiller (0.461 kW/ton)

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-118	NonRes	FALSE	Updated in v4.00	Water-cooled screw chiller (< 150 tons) with improved kw/ton	Water cooled screw chiller (0.632 kW/ton)
D03-119	NonRes	FALSE	Updated in v4.00	Water-cooled screw chiller (150-299 tons) with improved kw/ton	Water cooled screw chiller (0.574 kW/ton)
D03-120	NonRes	FALSE	Updated in v4.00	Water-cooled screw chiller (>= 300 tons) with improved kw/ton	Water cooled screw chiller (0.511 kW/ton)
D03-121	NonRes	FALSE	Updated in v4.00	VSD Centrifugal Chiller (150-299 tons) w/Load control tower	Water cooled VSD centrifugal chiller (0.507 kW/ton), load control tower
D03-122	NonRes	FALSE	Updated in v4.00	VSD Centrifugal Chiller (>= 300 tons) w/Load control tower	Water cooled VSD centrifugal chiller (0.461 kW/ton), load control tower
D03-123	NonRes	TRUE		Floor insulation raised to 2005 levels	Floor insulation raised to 2005 levels
D03-124	NonRes	TRUE		High eff. packaged unitary system HP (>= 760k)	9.7 EER / 3.3 COP Package A/C Heat Pump
D03-201	NonRes	FALSE	no longer needed	Air-cooled multiplex system w/extensive refrigeration equipment maintenance	Normal setpoints, representing tighter control
D03-202	NonRes	FALSE	no longer needed	Substitute high efficiency motors for standard efficiency	Utilizes a PSC motor
D03-203	NonRes	FALSE	no longer needed	Substitute high efficiency motors for standard efficiency	Utilizes an EC motor
D03-204	NonRes	FALSE	no longer needed	Adds an 85°F holdback valve, active only when needed	Heat reclaim with SCT controlled to 85°F via holdback valve when heat is needed
D03-205	NonRes	TRUE		Cover open MT cases between 1-5 a.m.	Night cover reduces infiltration by 50% for 4 hours/night
D03-206	NonRes	TRUE		Retrofit glass doors on open MT cases; additional lighting	Open fixture is retrofitted with doors and additional lighting
D03-207	NonRes	TRUE		Replace open MT case with new case with doors	Replace open fixtures with fixtures having doors
D03-208	NonRes	FALSE	Workpaper	Install automatic door closer on walk-in cooler doors	Applies a multiplier of 60% to the base-case infiltration
D03-209	NonRes	FALSE	Workpaper	Install automatic door closer on walk-in freezer doors	Applies a multiplier of 60% to the base-case infiltration

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-210	NonRes	FALSE	no longer needed	Cycle fan off with thermostat; duty cycle occasionally when off	Evaporator fan cycles w/ thermostat; when off cycles on peridoically
D03-211	NonRes	FALSE	no longer needed	Replace multiplex air-cooled condenser with evaporative condenser	Evaporative condenser of T24 efficiency, 2-speed fan, 80°SCT
D03-212	NonRes	FALSE	no longer needed	Upgrade from 53 Btu/Watt @ 10°F TD to 85 Btu/Watt	Same capacity condenser, sized at 10°F TD, and efficiency of 85 Btu/Watt, 80°F SCT
D03-213	NonRes	FALSE	no longer needed	Reduce design SCT by ~5°F and improve efficiency	Same capacity condenser but ~5°F lower SCT, 200 Btu/Watt, 80°F SCT
D03-214	NonRes	FALSE	no longer needed	Replace single-compressor system with subcooled multiplex	Multiplex system, air-cooled, subcooler on both LT & MT circuits, floating head
D03-215	NonRes	FALSE	no longer needed	Replace single-compressor system with subcooled multiplex	Multiplex system, evap-cooled, subcooler on both LT & MT circuits, floating head
D03-216	NonRes	FALSE	no longer needed	Replace single-compressor system with subcooled multiplex (high efficiency)	Multiplex system, hi-eff air-cooled, subcooler on both LT and MT circuits
D03-217	NonRes	FALSE	no longer needed	Replace single-compressor system with subcooled multiplex (high efficiency)	Multiplex system, hi-eff evap-cooled, subcooler on both LT and MT circuits
D03-218	NonRes	TRUE		Addition of a LT subcooler to an air-cooled multiplex	Low-temp subcooler (50°F) powered by medium-temp suction group
D03-219	NonRes	TRUE		Addition of LT and MT subcoolers to an air-cooled multiplex	Low- and medium-temp subcoolers powered by a new high-temp suction group
D03-220	NonRes	TRUE		Floating SST control on LT and MT suction groups	SST setpoint reset based on worst-case demand
D03-221	NonRes	TRUE		Floating SCT controlled to 70°F	SCT controlled to 70°F
D03-222	NonRes	TRUE		Floating SCT controlled to 70°F	SCT controlled to 70°F
D03-223	NonRes	TRUE		Ambient following SCT setpoint, 70°F minimum	Control SCT to ambient + 12°F TD, 70°F min, backflood setpoint of 68°F

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-224	NonRes	TRUE		Wetbulb following SCT setpoint, 70°F minimum	Control SCT to wetbulb + 17°F TD, 70°F min, backflood setpoint of 68°F
D03-225	NonRes	TRUE		Ambient following SCT setpoint, 70°F minimum, variable-spd condenser fan	Control SCT to ambient + 12°F TD, 70°F min, backflood setpt of 68°F, var-spd cond
D03-226	NonRes	TRUE		Wetbulb following SCT setpoint, 70°F minimum, variable-spd condenser fan	Control SCT to wetbulb + 17°F TD, 70°F min, backflood setpt of 68°F, var-spd cond
D03-227	NonRes	FALSE	Workpaper	Turn off fixture lights when store closed	Turn off lights between midnight and 6 a.m.
D03-228	NonRes	FALSE	no longer needed	Eliminate anti-sweat heaters from doors	Eliminate door heaters, 54W/door frame heat only, fixed output
D03-301	NonRes	FALSE	no longer needed	Extensive refrigeration equipment maintenance	Normal setpoints, representing tighter control
D03-302	NonRes	FALSE	no longer needed	Size condenser to ~5°F lower TD, 400 Btu/Watt	Condenser sized at ~18°F TD, 400 Btu/watt fan & pump, 80°F SCT setpoint
D03-303	NonRes	FALSE	no longer needed	Size condenser to ~5°F lower TD, efficient fans & pump, WB following setpt	Condenser sized at ~ 18°F TD, 400 Btu/watt fan & pump, WB-following SCT setpnt
D03-304	NonRes	FALSE	no longer needed	Add variable-speed control to one compressor in each suction group	Variable-speed drive to trim one compressor, remainder stage fully loaded
D03-305	NonRes	FALSE	no longer needed	Add mechanical subcooler to LT liquid line, fed by MT system	Subcooler on LT liquid circuit, provided by MT circuit, controlled to 50°F
D03-306	NonRes	TRUE		Floating SST control on LT and MT suction groups	SST setpoint reset based on worst-case demand
D03-307	NonRes	TRUE		Floating SCT controlled to 70°F	SCT controlled to 70°F, 68°F backflood control setpoint
D03-308	NonRes	TRUE		Wetbulb following SCT setpoint, 70°F minimum	Control SCT to wetbulb + 9°F TD, 70°F minimum, backflood setpoint of 68°F
D03-309	NonRes	TRUE		Wetbulb following SCT setpoint, 70°F min, variable-spd condenser fan	Control SCT to wetbulb + 9°F TD, 70°F min, backflood setpt of 68°F, var-spd cond
D03-401	Res	TRUE		Programmable Thermostat	Programmable Thermostat
D03-402	Res	FALSE	Updated in v4.00	13 SEER (11.09 EER) Split System Air Conditioner	13 SEER (11.09 EER) Split System Air Conditioner

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-403	Res	FALSE	Updated in v4.00	14 SEER (11.99 EER) Split-System Air Conditioner	14 SEER (11.99 EER) Split-System Air Conditioner
D03-404	Res	FALSE	Updated in v4.00	15 SEER (12.72 EER) Split-System Air Conditioner	15 SEER (12.72 EER) Split-System Air Conditioner
D03-405	Res	TRUE		Direct Evaporative Cooler	Direct Evaporative Cooler
D03-406	Res	TRUE		Indirect Evaporative Cooler	Indirect Evaporative Cooler
D03-407	Res	TRUE		Direct-Indirect Evaporative Cooler	Direct-Indirect Evaporative Cooler
D03-408	Res	FALSE	Updated in v4.00	Typical Refrigerant Charge Adjustment (< ±20% rated charge)	Standard Cooling Performance (proper refrigerant charge)
D03-409	Res	FALSE	Updated in v4.00	High Refrigerant Charge Adjustment (>= ±20% rated charge)	Standard Cooling Performance (proper refrigerant charge)
D03-410	Res	FALSE	Updated in v4.00	Condensing 90 AFUE (1.11 HIR) Furnace	Condensing 90 AFUE (1.11 HIR) Furnace
D03-411	Res	FALSE	Updated in v4.00	Condensing 92 AFUE (1.08 HIR) Furnace	Condensing 92 AFUE (1.08 HIR) Furnace
D03-412	Res	FALSE	Updated in v4.00	Condensing 94 AFUE (1.06 HIR) Furnace	Condensing 94 AFUE (1.06 HIR) Furnace
D03-413	Res	FALSE	Updated in v4.00	Condensing 96 AFUE (1.03 HIR) Furnace	Condensing 96 AFUE (1.03 HIR) Furnace
D03-414	Res	FALSE	Updated in v4.00	13 SEER (11.07 EER) / 8.1 HSPF (3.28 COP) A/C Heat pump	13 SEER (11.07 EER) / 8.1 HSPF (3.28 COP) A/C Heat pump
D03-415	Res	FALSE	Updated in v4.00	14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat Pump	14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat Pump
D03-416	Res	FALSE	Updated in v4.00	15 SEER (12.70 EER) / 8.8 HSPF (3.74 COP) A/C Heat Pump	15 SEER (12.70 EER) / 8.8 HSPF (3.74 COP) A/C Heat Pump
D03-417	Res	FALSE	Updated in v4.00	18 SEER (12.8 EER) / 9.2 HSPF (3.66 COP) A/C Heat Pump	18 SEER (12.88 EER) / 8.5 HSPF (3.32 COP) A/C Heat Pump
D03-418	Res	FALSE	Updated in v4.00	Duct Sealing (Total Leakage Reduced from 40% of AHU flow to 12%)	Duct Sealing (Total Leakage Reduced from 40% of AHU flow to 12%)
D03-420	Res	FALSE	Updated in v4.00	Ceiling R-0 to R-30 Insulation-Batts	Ceiling R-0 to R-30 Insulation-Batts
D03-421	Res	FALSE	Updated in v4.00	Ceiling R-0 to R-38 Insulation-Batts	Ceiling R-0 to R-38 Insulation-Batts
D03-422	Res	FALSE	Updated in v4.00	Ceiling Vintage to R-30 Insulation-Batts	Ceiling Vintage to R-30 Insulation-Batts
D03-423	Res	FALSE	Updated in v4.00	Ceiling Vintage to R-38 Insulation-Batts	Ceiling Vintage to R-38 Insulation-Batts

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-424	Res	FALSE	Updated in v4.00	Ceiling Vintage to R-49 Insulation-Batts	Ceiling Vintage to R-49 Insulation-Batts
D03-426	Res	TRUE		Floor R-0 to R-19 Insulation Batts	Floor R-0 to R-19 Insulation Batts
D03-427	Res	TRUE		Floor R-0 to R-30 Insulation Batts	Floor R-0 to R-30 Insulation Batts
D03-428	Res	TRUE		Floor R-19 to R-30 Insulation-Batts	Floor R-19 to R-30 Insulation-Batts
D03-429	Res	TRUE		Wall 2x4 R-15 Insulation-Batts	Wall 2x4 R-15 Insulation-Batts
D03-430	Res	TRUE		Wall 2x6 R-19 Insulation-Batts	Wall 2x6 R-19 Insulation-Batts
D03-431	Res	TRUE		Wall 2x6 R-21 Insulation-Batts	Wall 2x6 R-21 Insulation-Batts
D03-435	Res	TRUE		Wall 2x4 R-13 Batts + R-5 Rigid	Wall 2x4 R-13 Batts + R-5 Rigid
D03-436	Res	TRUE		Wall 2x6 R-19 Batts + R-5 Rigid	Wall 2x6 R-19 Batts + R-5 Rigid
D03-437	Res	TRUE		Wall 2x6 R-21 Batts + R-5 Rigid	Wall 2x6 R-21 Batts + R-5 Rigid
D03-438	Res	FALSE	Updated in v4.00	Wall Blow-In R-0 to R-13 Insulation	Wall Blow-In R-0 to R-13 Insulation
D03-439	Res	FALSE	no longer needed	Low-Income Weatherization w/out Evaporative Cooler	Infiltration of 0.35 Air Changes per Hour
D03-440	Res	FALSE	no longer needed	Low-Income Weatherization w/ Evaporative Cooler	Direct Evap Cooling with Infiltration of 0.35 Air Changes per Hour
D03-441	Res	TRUE		Whole House Fans	Whole House Fans
D03-442	Res	FALSE	requires update	Default Window With Sunscreen	Default Window With Sunscreen
D03-443	Res	FALSE	requires update	Single Pane Clear Glass With Reflective Film	Single Pane Clear Glass With Reflective Film
D03-444	Res	FALSE	requires update	Single Pane Clear Glass With Spectrally Selective Film	Single Pane Clear Glass With Spectrally Selective Film
D03-445	Res	FALSE	requires update	Single Pane Clear Glass With Standard Film	Single Pane Clear Glass With Standard Film
D03-446	Res	FALSE	requires update	U-0.50 / SHGC-0.65 (clear) Window	U-0.50 / SHGC-0.65 (clear) Window
D03-447	Res	FALSE	requires update	U-0.40 / SHGC-0.65 (clear) Window	U-0.40 / SHGC-0.65 (clear) Window
D03-448	Res	FALSE	requires update	U-0.35 / SHGC-0.55 (clear) Window	U-0.35 / SHGC-0.55 (clear) Window

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-449	Res	FALSE	requires update	U-0.25 / SHGC-0.35 (clear) Window	U-0.25 / SHGC-0.35 (clear) Window
D03-450	Res	FALSE	requires update	U-0.50 / SHGC-0.40 (tint) Window	U-0.50 / SHGC-0.40 (tint) Window
D03-451	Res	FALSE	requires update	U-0.40 / SHGC-0.40 (tint) Window	U-0.40 / SHGC-0.40 (tint) Window
D03-452	Res	FALSE	requires update	U-0.35 / SHGC-0.32 (tint) Window	U-0.35 / SHGC-0.32 (tint) Window
D03-453	Res	FALSE	requires update	U-0.25 / SHGC-0.22 (tint) Window	U-0.25 / SHGC-0.22 (tint) Window
D03-458	Res	FALSE	Updated in v4.00	Duct Sealing (Total Leakage Reduced from 24% of AHU flow to 12%)	Duct Sealing (Total Leakage Reduced from 24% of AHU flow to 12%)
D03-459	Res	FALSE	Updated in v4.00	Typical Refrigerant Charge Adjustment (< ±20% rated charge) + Duct Sealing	Standard Cooling Performance, reduced duct loss
D03-460	Res	FALSE	Updated in v4.00	High Refrigerant Charge Adjustment (>= ±20% rated charge) + Duct Sealing	Standard Cooling Performance, reduced duct loss
D03-461	Res	FALSE	Updated in v4.00	Basic Furnace Upgrade to 81% AFUE	Basic Furnace Upgrade to 81% AFUE
D03-462	Res	FALSE	Updated in v4.00	Mobile Home Duct Sealing (Supply Leakage Reduced from 35% of AHU flow to 15%)	Mobile Home Duct Sealing (Supply Leakage Reduced from 35% of AHU flow to 15%)
D03-463	Res	FALSE	Updated in v4.00	16 SEER (11.61 EER) Split System Air Conditioner	16 SEER (11.61 EER) Split System Air Conditioner
D03-464	Res	FALSE	Updated in v4.00	17 SEER (12.28 EER) Split-System Air Conditioner	17 SEER (12.28 EER) Split-System Air Conditioner
D03-465	Res	FALSE	Updated in v4.00	18 SEER (13.37 EER) Split-System Air Conditioner	18 SEER (13.37 EER) Split-System Air Conditioner
D03-466	Res	FALSE	Updated in v4.00	16 SEER (12.06 EER) / 8.4 HSPF (3.48 COP) A/C Heat Pump	16 SEER (12.06 EER) / 8.4 HSPF (3.48 COP) A/C Heat Pump
D03-467	Res	FALSE	Updated in v4.00	17 SEER (12.52 EER) / 8.6 HSPF (3.26 COP) A/C Heat Pump	17 SEER (12.52 EER) / 8.6 HSPF (3.26 COP) A/C Heat Pump
D03-468	Res	FALSE	Updated in v4.00	Mobile Home Duct Sealing (Supply Leakage Reduced from 25% of AHU flow to 15%)	Mobile Home Duct Sealing (Supply Leakage Reduced from 25% of AHU flow to 15%)
D03-801	Res	FALSE	Updated in v4.00	13 Watt Intergral CFL - Outdoor	13 Watt < 800 Lumens - screw-in - Outdoor
D03-802	Res	FALSE	Updated in v4.00	13 Watt Intergral CFL - Outdoor	13 Watt >=800 Lumens - screw-in - Outdoor

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-803	Res	FALSE	Updated in v4.00	14 Watt Intergral CFL - Outdoor	14 Watt - screw-in - Outdoor
D03-804	Res	FALSE	Updated in v4.00	15 Watt Intergral CFL - Outdoor	15 Watt - screw-in - Outdoor
D03-805	Res	FALSE	Updated in v4.00	16 Watt Intergral CFL - Outdoor	16 Watt - screw-in - Outdoor
D03-806	Res	FALSE	Updated in v4.00	18 Watt Intergral CFL - Outdoor	18 Watt < 1,100 Lumens - screw-in - Outdoor
D03-807	Res	FALSE	Updated in v4.00	18 Watt Intergral CFL - Outdoor	18 Watt >=1,100 Lumens - screw-in - Outdoor
D03-808	Res	FALSE	Updated in v4.00	19 Watt Intergral CFL - Outdoor	19 Watt >=1,100 Lumens - screw-in - Outdoor
D03-809	Res	FALSE	Updated in v4.00	20 Watt Intergral CFL - Outdoor	20 Watt - screw-in - Outdoor
D03-810	Res	FALSE	Updated in v4.00	23 Watt Intergral CFL - Outdoor	23 Watt - screw-in - Outdoor
D03-811	Res	FALSE	Updated in v4.00	25 Watt Intergral CFL - Outdoor	25 Watt <1,600 Lumens - screw-in - Outdoor
D03-812	Res	FALSE	Updated in v4.00	25 Watt Intergral CFL - Outdoor	25 Watt >=1,600 Lumens - screw-in - Outdoor
D03-813	Res	FALSE	Updated in v4.00	26 Watt Intergral CFL - Outdoor	26 Watt <1,600 Lumens - screw-in - Outdoor
D03-814	Res	FALSE	Updated in v4.00	26 Watt Intergral CFL - Outdoor	26 Watt >=1,600 Lumens - screw-in - Outdoor
D03-815	Res	FALSE	Updated in v4.00	28 Watt Intergral CFL - Outdoor	28 Watt - screw-in - Outdoor
D03-816	Res	FALSE	Updated in v4.00	30 Watt Intergral CFL - Outdoor	30 Watt - screw-in - Outdoor
D03-817	Res	FALSE	Updated in v4.00	36 Watt Intergral CFL - Outdoor	36 Watt - screw-in - Outdoor
D03-818	Res	FALSE	Updated in v4.00	40 Watt Intergral CFL - Outdoor	40 Watt - screw-in - Outdoor
D03-819	Res	FALSE	Updated in v4.00	13 Watt Fixture CFL - Outdoor	13 Watt < 800 Lumens - pin based hardwire fixture - Outdoor
D03-820	Res	FALSE	Updated in v4.00	13 Watt Fixture CFL - Outdoor	13 Watt >=800 Lumens - pin based hardwire fixture - Outdoor
D03-821	Res	FALSE	Updated in v4.00	14 Watt Fixture CFL - Outdoor	14 Watt - pin based hardwire fixture - Outdoor
D03-822	Res	FALSE	Updated in v4.00	15 Watt Fixture CFL - Outdoor	15 Watt - pin based hardwire fixture - Outdoor
D03-823	Res	FALSE	Updated in v4.00	16 Watt Fixture CFL - Outdoor	16 Watt - pin based hardwire fixture - Outdoor

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-824	Res	FALSE	Updated in v4.00	18 Watt Fixture CFL - Outdoor	18 Watt < 1,100 Lumens - pin based hardwire fixture - Outdoor
D03-825	Res	FALSE	Updated in v4.00	18 Watt Fixture CFL - Outdoor	18 Watt >=1,100 Lumens - pin based hardwire fixture - Outdoor
D03-826	Res	FALSE	Updated in v4.00	19 Watt Fixture CFL - Outdoor	19 Watt >=1,100 Lumens - pin based hardwire fixture - Outdoor
D03-827	Res	FALSE	Updated in v4.00	20 Watt Fixture CFL - Outdoor	20 Watt - pin based hardwire fixture - Outdoor
D03-828	Res	FALSE	Updated in v4.00	23 Watt Fixture CFL - Outdoor	23 Watt - pin based hardwire fixture - Outdoor
D03-829	Res	FALSE	Updated in v4.00	25 Watt Fixture CFL - Outdoor	25 Watt <1,600 Lumens - pin based hardwire fixture - Outdoor
D03-830	Res	FALSE	Updated in v4.00	25 Watt Fixture CFL - Outdoor	25 Watt >=1,600 Lumens - pin based hardwire fixture - Outdoor
D03-831	Res	FALSE	Updated in v4.00	26 Watt Fixture CFL - Outdoor	26 Watt <1,600 Lumens - pin based hardwire fixture - Outdoor
D03-832	Res	FALSE	Updated in v4.00	26 Watt Fixture CFL - Outdoor	26 Watt >=1,600 Lumens - pin based hardwire fixture - Outdoor
D03-833	Res	FALSE	Updated in v4.00	28 Watt Fixture CFL - Outdoor	28 Watt - pin based hardwire fixture - Outdoor
D03-834	Res	FALSE	Updated in v4.00	30 Watt Fixture CFL - Outdoor	30 Watt - pin based hardwire fixture - Outdoor
D03-835	Res	FALSE	Updated in v4.00	40 Watt Fixture CFL - Outdoor	40 Watt - pin based hardwire fixture - Outdoor
D03-836	Res	FALSE	Updated in v4.00	55 Watt Fixture CFL - Outdoor	55 Watt - pin based hardwire fixture - Outdoor
D03-837	Res	FALSE	Updated in v4.00	65 Watt Fixture CFL - Outdoor	65 Watt - pin based hardwire fixture - Outdoor
D03-838	Res	FALSE	Updated in v4.00	20W CFL Table Lamp	20W CFL Table Lamp - pin based
D03-839	Res	FALSE	Updated in v4.00	25W CFL Table Lamp	25W CFL Table Lamp - pin based
D03-840	Res	FALSE	Updated in v4.00	30W CFL Table Lamp	30W CFL Table Lamp - pin based
D03-841	Res	FALSE	Updated in v4.00	55W CFL Table Lamp	55W CFL Table Lamp - pin based
D03-842	Res	FALSE	Updated in v4.00	55W CFL Torchiere	55W CFL Torchiere - pin based
D03-843	Res	FALSE	Updated in v4.00	70W CFL Torchiere (two LAMPs)	70W CFL Torchiere (two LAMPs) - pin based
D03-844	NonRes	FALSE	Updated in v4.00	50W Metal Halide	50W Metal Halide

DEER 2005 Measure ~~ID~~	~~Sector~~	**Included in DEER 2011?**	Reason for Removing	Measure Name	Measure Description
D03-845	NonRes	FALSE	Updated in v4.00	75W Metal Halide	75W Metal Halide
D03-846	NonRes	FALSE	Updated in v4.00	100W Metal Halide	100W Metal Halide
D03-852	NonRes	FALSE	Updated in v4.00	Premium T8 El Ballast	Four ft. 2 lamp fixture, ballast factor of less than or equal to 0.77
D03-853	NonRes	FALSE	Updated in v4.00	T8 32W Dimming El Ballast	Four ft. 2 lamp fixture
D03-854	NonRes	FALSE	Updated in v4.00	De-lamp from 4', 4 lamp/fixture	Four ft. 4 lamp fixture
D03-855	NonRes	FALSE	Updated in v4.00	De-lamp from 8', 4 lamp/fixture	Eight ft. 4 lamp fixture
D03-856	NonRes	FALSE	update required	Occ-Sensor - Wall box	Assume control 3 2-lamp fixtures w/T8 34W EL Ballast
D03-857	NonRes	FALSE	update required	Occ-Sensor - Plug loads	Assume control 50W of task lighting and a computer monitor
D03-858	NonRes	FALSE	update required	Timeclock:	Controling 4 - 70W (95W w/ballast) HPS fixtures
D03-859	NonRes	FALSE	update required	Photocell:	Assume in conjunction with time-clock controling 4 - 70W (95W w/ballast) HPS fixtures
D03-901	NonRes	FALSE	no longer needed	High Efficiency Copier	0-20 copies/minute
D03-902	NonRes	FALSE	no longer needed	High Efficiency Copier	21 44copies/minute
D03-903	NonRes	FALSE	no longer needed	High Efficiency Copier	Over 45 copies/minute
D03-904	NonRes	FALSE	Workpaper	High Efficiency Gas Fryer	Base use = 25 kBtu/hour; Eff use = 15 kBtu/hour
D03-905	NonRes	FALSE	Workpaper	High Efficiency Gas Griddle	Base use = 25 kBtu/hour; Eff use = 20 kBtu/hour
D03-906	NonRes	FALSE	Workpaper	High Efficiency Electric Fryer	Base use = 2.8 kW/hour; Eff use = 2.4 kW/hour
D03-907	NonRes	FALSE	Workpaper	Hot Food Holding Cabinet	Base use = 1.35 kW/hour; Eff use = 0.43 kW/hour
D03-908	NonRes	FALSE	Workpaper	Connectionless Steamer	Base use = 1.0 kW/hour; Eff use = 0.5 kW/hour
D03-909	NonRes	FALSE	no longer needed	Point of Use Water Heat	Point of Use Water Heat
D03-910	NonRes	FALSE	no longer needed	Circulation Pump Timeclock	Circulation Pump Timeclock

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-911	NonRes	FALSE	Updated in v4.00	High Eff. Water Heater, EF=0.64	High Eff. Water Heater
D03-912	NonRes	FALSE	Workpaper	Vending Machine Controller	Cold Drink Vending Machine
D03-913	NonRes	FALSE	Workpaper	Vending Machine Controller	Uncooled Snack Machine
D03-914	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 1 HP	Open Drip Proof: 2076 Hours of Operation
D03-915	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 5 HP	Open Drip Proof: 2076 Hours of Operation
D03-916	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 10 HP	Open Drip Proof: 2076 Hours of Operation
D03-917	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 15 HP	Open Drip Proof: 2076 Hours of Operation
D03-918	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 20 HP	Open Drip Proof: 2820 Hours of Operation
D03-919	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 25 HP	Open Drip Proof: 2820 Hours of Operation
D03-920	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 50 HP	Open Drip Proof: 2820 Hours of Operation
D03-921	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 100 HP	Open Drip Proof: 2820 Hours of Operation
D03-922	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 150 HP	Open Drip Proof: 2820 Hours of Operation
D03-923	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 200 HP	Open Drip Proof: 2215 Hours of Operation
D03-924	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 1 HP	Closed Drip Proof: 2076 Hours of Operation
D03-925	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 5 HP	Closed Drip Proof: 2076 Hours of Operation
D03-926	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 10 HP	Closed Drip Proof: 2076 Hours of Operation
D03-927	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 15 HP	Closed Drip Proof: 2076 Hours of Operation
D03-928	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 20 HP	Closed Drip Proof: 2820 Hours of Operation
D03-929	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 25 HP	Closed Drip Proof: 2820 Hours of Operation
D03-930	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 50 HP	Closed Drip Proof: 2820 Hours of Operation
D03-931	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 100 HP	Closed Drip Proof: 2820 Hours of Operation

DEER 2005 Measure ID	Sector	Included in DEER 2011?	Reason for Removing	Measure Name	Measure Description
D03-932	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 150 HP	Closed Drip Proof: 2820 Hours of Operation
D03-933	NonRes	FALSE	is current code requirement	Premium Efficiency Motor - 200 HP	Closed Drip Proof: 2215 Hours of Operation
D03-934	Res	FALSE	Workpaper	Faucet Aerators	Faucet Aerators
D03-935	Res	FALSE	update required	Heat Pump Water Heater	Heat pump water heater, EF=2.9
D03-936	Res	FALSE	update required	Pipe Wrap	Pipe wrap
D03-937	Res	FALSE	Workpaper	Low Flow Showerhead	Low Flow Showerhead
D03-938	Res	FALSE	Updated in v4.00	High Efficiency Water Heater	High Efficiency Water Heater - Gas, EF = 0.63
D03-939	Res	FALSE	Updated in v4.00	High Efficiency Water Heater	High Efficiency Water Heater - Electric, EF=0.93
D03-940	Res	FALSE	no longer needed	Point of Use Water Heat	Point of Use Water Heat
D03-941	Res	FALSE	out-of-date	Efficient Clothes Dryer	High Efficiency Electric Clothes Dryer with Moisture Sensor.
D03-942	Res	FALSE	out-of-date	Efficient Clothes Dryer	High Efficiency Gas Clothes Dryer with Moisture Sensor.
D03-943	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 1.5 cf	CEE Tier 1: MEF=1.42, 1.5 cf Capacity
D03-944	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 1.5 cf	CEE Tier 2: MEF=1.60, 1.5 cf capacity
D03-945	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 1.5 cf	CEE Tier 3: MEF=1.80, 1.5 cf capacity
D03-946	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 2.65 cf	CEE Tier 1: MEF=1.42, 2.65 cf capacity
D03-947	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 2.65 cf	CEE Tier 2: MEF=1.60, 2.65 cf capacity
D03-948	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 2.65 cf	CEE Tier 3: MEF=1.80, 2.65 cf capacity
D03-949	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 3.5 cf	CEE Tier 1: MEF=1.42, 3.5 cf capacity
D03-950	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 3.5 cf	CEE Tier 2: MEF=1.60, 3.5 cf Capacity
D03-951	Res	FALSE	Updated in v4.00	Energy Star Clothes Washer - 3.5 cf	CEE Tier 3: MEF=1.80, 3.5 cf Capacity
D03-952	Res	FALSE	Updated in v4.00	Energy Star Dish Washer	Energy Star Dishwasher, EF=0.58

DEER 2005 Measure ~~ID~~	~~Sector~~	**Included in DEER 2011?**	Reason for Removing	Measure Name	Measure Description
D03-953	Res	FALSE	Updated in v4.00	Energy Star Dish Washer	Energy Star Dishwasher, EF=0.58
D03-966	Res	FALSE	not allowed by T20 anymore	Efficient Single Speed Pool Pump	Efficient Single Speed Pool Pump, 1.5 hp
D03-967	Res	FALSE	not allowed by T20 anymore	Efficient Two Speed Pool Pump	Efficient Two Speed Pool Pump, 1.5 hp
D03-970	NonRes	FALSE	out-of-date	Low Pressure Sprinkler Nozzle - Portable	Low pressure sprinkler nozzle, Portable system.
D03-971	NonRes	FALSE	out-of-date	Low Pressure Sprinkler Nozzle - Solid set	Low pressure sprinkler nozzle, Solid set system.
D03-972	NonRes	FALSE	out-of-date	Sprinkler to Micro irrigation - Field/Vegs - non well	Micro irrigation in fields without a well
D03-973	NonRes	FALSE	out-of-date	Sprinkler to Micro irrigation - Field/Vegs - well	Micro irrigation in fields with a well
D03-974	NonRes	FALSE	out-of-date	Sprinkler to Micro irrigation - Decid Trees - non well	Micro irrigation of deciduous trees without a well
D03-975	NonRes	FALSE	out-of-date	Sprinkler to Micro irrigation - Decid Trees - well	Micro irrigation of deciduous trees with a well
D03-976	NonRes	FALSE	out-of-date	Sprinkler to Micro irrigation - Citrus Trees - non well	Micro irrigation of citrus trees without a well
D03-977	NonRes	FALSE	out-of-date	Sprinkler to Micro irrigation - Citrus Trees - well	Micro irrigation of citrus trees with a well
D03-978	NonRes	FALSE	out-of-date	Sprinkler to Micro irrigation - grapes - non well	Micro irrigation of grapes without a well
D03-979	NonRes	FALSE	out-of-date	Sprinkler to Micro irrigation - grapes - well	Micro irrigation of grapes with a well
D03-980	NonRes	FALSE	Updated in v4.00	Infrared Film for Greenhouses	Greenhouse Infrared Film
D03-981	NonRes	FALSE	Updated in v4.00	Greenhouse Heat Curtain	Greenhouse Heat Curtain
D03-982	NonRes	FALSE	out-of-date	Variable Frequency Drives with feedback controls for Dairy Pumps	Add VFD to Dairy Vacuum Pump
D03-983	NonRes	FALSE	out-of-date	Ventilation Fans or Box Fans (6)	High efficiency ventilation fan
D03-984	NonRes	FALSE	out-of-date	High Volume Low Speed Fans 16 Ft Diameter (4)	16 Foot Diameter fan with 35 Ft Spacing Free Stall Barn
D03-985	NonRes	FALSE	out-of-date	High Volume Low Speed Fans 18 Ft Diameter (3)	18 Foot Diameter fan with 40 Ft Spacing Free Stall Barn
D03-986	NonRes	FALSE	out-of-date	High Volume Low Speed Fans 20 Ft Diameter (3)	20 Foot Diameter fan with 50 Ft Spacing Free Stall Barn

DEER 2005 Measure ID	Sector	**Included in DEER 2011?**	Reason for Removing	Measure Name	Measure Description
D03-987	NonRes	FALSE	out-of-date	High Volume Low Speed Fans 24 Ft Diameter (2)	24 Foot Diameter fan with 60 Ft Spacing Free Stall Barn

Attachment B – DEER Update Applicability Matrix

Research Area	Methodology	Prototype	Measure Characteristics	Description of Likely Investigation	Possible Update Action Items
Previously Retired DEER Measures	X		X	• Review comments and reply comments from D12-05-015 for concerns about removed measures • Review assumptions and methodologies for removed measures	Preliminary areas of possible additions to DEER: • Irrigation measures • Limited set of commercial refrigeration measures • DHW end use measures such as low-flow faucets and shower heads
Improvements to Analysis Tools and Modeling Methods	X	X		• Review recent improvements to DOE-2 energy simulation software related to residential infiltration and duct leakage modeling. • The DEER team has developed more detailed prototype models for large greenhouses that provide more accurate results for heating system energy use. • The DEER team has begun to gather detailed performance data on a wide range of package AC/HP HVAC equipment currently available in the market place.	• Updates to duct leakage and infiltration modeling in all residential prototypes: Single Family; Multi-Family; Mobile Home • Revisions to greenhouse measures: heat curtains; infra-red film; heat-curtain plus infra-red film • Revised HVAC performance maps for package AC/HP equipment <240kBtuh nominal cooling capacity
Workpapers for NonDEER Measures for the 2013-2014 Cycle	X		X	• Latest lighting workpapers include a large number of lighting fixtures and lamps that are not currently defined in DEER. While many of these fixtures will be added as part of the 2013 update, revised workpapers that include new technologies will likely be submitted prior to the publication of DEER 2014. IOUs are currently collaborating on a uniform statewide list of common high-efficiency lighting fixtures.	• Updates to DEER lighting technology lists that provide standard lighting technology classifications, uniform statewide power ratings, and default code baseline code technologies

Research Area	Methodology	Prototype	Measure Characteristics	Description of Likely Investigation	Possible Update Action Items
2011 Potential and Goals Study			X	• Review of workpapers identified in study as having greatest potential • Review of emerging technologies identified in study as having greatest potential	• Determine if there are simplified ways to adapt current DEER analysis processes to accommodate new measures or emerging technologies
2006-2008 EM&V		X	X	• Finalize review and analysis of SmallCom & LGP lighting logger studies	• Revise lighting usage profiles in applicable DEER building types. This will have the secondary effect of revising savings values of lighting measures since the profiles will result in different hours of use. Savings will increase or decrease based on the proportional change of the new annual hours of use compared to those used for 2011 DEER.
Commercial Saturation Survey		X	X	• Review final population weights • Review data for revisions to physical characteristics of buildings	• Revise commercial building weights • Revise physical characteristics such as configuration, architectural features, activity area allocation • Revise prototypical energy consuming end use features such as installed lighting power; plug load levels; HVAC system features, configuration and efficiency
Commercial Market Share Tracking		X	X	• Along with CSS data, review data for trends in standard practices for purchase and replacement of common energy using equipment including lighting, HVAC, technology and refrigeration.	• Revisions to commercial prototype characteristics • Revisions to industry standard practice (2nd baseline) for early retirement measures with no code baseline
California Lighting and Appliance Saturation Study		X	X		
Residential/Advanced/Upstream Lighting Impact Evaluation		X	X	• Review of data and analysis looking at non-CFL => CFL replacement lamp wattage reductions • Collaboration with ULP consultants on forward looking NTG analysis	• Revisions of lamp wattage reduction ratios for various CFL technologies • Revision of upstream CFL NTG

Research Area	Methodology	Prototype	Measure Characteristics	Description of Likely Investigation	Possible Update Action Items
2009 Residential Appliance Saturation Survey	X	X		• Work with RASS consultant to generate saturation data by Title 24 climate zone	• Update residential building weights • Update residential UEC calibration targets – this in turn requires revisions to basic residential inputs such as thermostat schedules in order to calibrate to heating and cooling UECs.
Business and Consumer Electronics Impact Evaluation			X	• Revision of NTG for televisions	• Revision of NTG for televisions